REMARKS

Summary

Amendments have been made to place the application in a better form for examination.

Claims 1-8, have been cancelled and new Claims 9-28 have been presented. The claims have been rewritten to better express the subject matter being claimed.

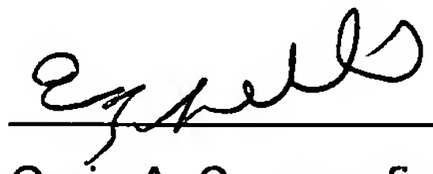
The specification has been amended, and due to the number of changes, a substitute specification has been prepared. No new matter has been added. The amendments made to the PCT application are not in the translation of the PCT application as filed. The substitute specification incorporates the amendments to the specification made in the PCT stage.

Conclusion

Claims 9-28 are pending.

The Applicants respectfully submit that the pending claims are allowable and look forward to the early issuance of a Notice of Allowance. The Examiner is respectfully requested to contact the undersigned in the event that a telephone interview would expedite consideration of the application.

Respectfully submitted,



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Attorney Docket No. 11371-113
Siemens AG Ref. No.
Substitute Specification With Markings

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Our Case No. 11371-113

Client Ref. No. 2002P17083WOUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE: **DEVICE FOR SUPPORTING A PATIENT FOR COMPUTER TOMOGRAPHS**

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Attorney Docket No. 11371-113
Siemens AG Ref. No.
Substitute Specification With Markings

DEVICE FOR SUPPORTING A PATIENT FOR COMPUTER TOMOGRAPHS

TECHNICAL FIELD

[0001] This~~e~~ application~~invention~~ relates to a device for supporting a patient for a computer tomography device, and to a computer tomograph having such a device for supporting a patient.

BACKGROUND

[0002] Computer tomography devices (CTs), ~~or simply CTs,~~ serve to make three-dimensional images or images of slices through a body to be examined. The image data are obtained by means of X-radiation, using an X-ray beam source that rotates on a circular path around the body to be examined. An X-ray detector rotates jointly with the X-ray beam source, but diametrically opposite to the beam source ~~it~~, and detects the raw image data.

[0003] The raw image data represent two-dimensional X-ray projections with many different projection directions, ~~dictated by~~corresponding to the rotation. From the two-dimensional X-ray projections, slice images or three-dimensional X-ray images are generated by a computer.

[0004] The quality of the X-ray images that can be generated depends substantially on the stable, exact position of the body to be examined. Deviations in the position of the body from the optimal position in the CT and changes in the body position during the time-consuming ~~detection~~ acquisition~~-~~ of the X-ray image ~~detector~~ data impair the quality of the resultant images.

[0005] To be able to assure the stable and exact positioning of the body of the patient ~~or in other words the patient~~ in the CT, ~~it is usual to provide~~ a device for supporting a patient is provided. A CT has a so-called "gantry", inside of which the X-ray beam source and the X-ray image detector rotate. At the center of ~~this~~ rotary motion, the gantry has an opening, in which the patient ~~must be~~is positioned for the ~~detection~~ acquisition of the raw image data. The device for supporting a

patient serves to slide a patient, supported on the supporting device~~it~~, into the opening in the gantry.

[0006] The supporting device is sufficiently stable to be able to bear the weight of the patient, and sufficiently movable to enable positioning the patient inside the gantry.

[0007] However, sagging of the device for supporting a patient or of a stretcher placed on ~~it~~ the supporting device from the weight of the patient cannot ~~hardly~~ be avoided. ~~It is usual to reduce or prevent~~ Ssuch sagging may be reduced by means of additional structural provisions, such as additional braces.

[0008] The device for supporting a patient is intended to allow placing the patient or the stretcher along with the patient onto it without problems. To that end, ~~it~~ the supporting device should be movable in many directions and in particular should be capable of being lowered quite far, so that a patient being placed on it or shifted to ~~it~~ the supporting device need not be lifted. On the one hand, this puts less of a burden on the medical staff. On the other, this~~it~~ also ~~relieves~~ is beneficial to the patient, for whom, depending on ~~his~~ physical condition, the shifting can be unpleasant and painful. Especially when a patient is being examined by more than one kind of medical equipment, such as a CT as well as a C-arch X-ray machine, the frequent shifting from one machine to another is a great burden and entails great effort.

[0009] German Patent Disclosure DE 101 08 549, ~~it is known to~~teaches supporting a patient on a stretcher that can be moved by a so-called trolley, or ~~in other words a~~ movable carriage. To make a CT scan, the stretcher is placed on a fixed base, located in front of the gantry of a CT, ~~on~~ with which the stretcher ~~it~~ can be introduced into the gantry and removed again. The fixed base assures stable positioning of the patient, but. ~~It~~ does not offer any further motion capabilities.

SUMMARY~~T~~

[0010] A device for supporting a patient for a CT, which assures stable positioning of the patient with respect to a CT or other device and at the same time

offers versatile movability is disclosed. ~~The further object of the invention is to disclose a~~A CT with a device for supporting a patient is provided in which stable positioning of the patient and at the same time versatile moveability are assured.

[0011] ~~This object is attained by a device for supporting a patient having the characteristics of the independent claim 1.~~

[0012] A ~~fundamental concept of the invention is to disclose a~~ device ~~for~~ supports~~ing~~ a patient for a computer tomography device and a computer tomography device having such a device for supporting a patient~~, which~~ includes a gantry with an examination opening for introducing a patient to be examined.~~;~~ Tthe device for supporting a patient has a height adjuster, ~~which is embodied~~ for supporting a stretcher adjustably in height. The height adjuster ~~can~~ may be mounted on ~~the~~ a computer tomography device in such a way that it is located laterally ~~of~~ with respect to the examination opening. An effect of the ~~Because of the~~ lateral location of the height adjuster~~, there~~ is ~~the advantage~~ that the space underneath the examination opening in front of the gantry remains free, and a patient or a stretcher can be lowered especially far ~~there~~when disposed in that position. The lowerability is not hindered by the location of the height adjuster. ~~Because of the flexible lowering,~~ Aan optimal height in a given instance can be ~~assumed~~ selected for placing a patient on a stretcher ~~or shifting him~~or shifting the patient. Support of the patient or the stretcher in the immediate vicinity in front of the examination opening ~~can~~ may also be ~~accomplished~~provided, ~~thus providing~~ resulting in stable support of the patient ~~largely~~ and reducing ~~without~~ sagging of the stretcher from the patient's weight.

[0013] ~~An advantageous embodiment of the invention is that~~ In an aspect, the height adjuster can be mounted on the computer tomography (CT) device in such a way that it is located laterally with respect to the gantry. In such a position, the height adjuster ~~This has the advantage that it~~ does not ~~stand in the way of~~impede a tilting motion of the gantry about a horizontal axis, and such a ~~a~~ motion being~~that is usual~~useful in the field of medical diagnosis. ~~Instead, t~~The gantry can be tilted unhindered next to and thus past the height adjuster.

[0014] ~~A further advantageous embodiment of the invention is that~~In another aspect, the height adjuster has a load-bearing arm ~~which is embodied for~~ disposed to ~~support~~supporting the stretcher. The load-bearing arm is connected to the height adjuster ~~in such a way~~such~~-~~ that the~~its~~ height thereof is adjustable by the~~is~~ height adjuster.~~,~~ The load-bearing arm is supported rotatably about a vertical axis. ~~This makes for especially versatile movability of the device for supporting a patient . For example,~~ W~~w~~with the patient lying on ~~i~~the stretcher~~t~~, the load bearing arm~~it~~ can be pivoted out of the way of the gantry. This additional movability ~~makes even more optimal~~may facilitate the positioning of the device for supporting a patient ~~possible~~, for placing the patient on the device,~~it~~ or for shifting the patient ~~him~~ onto the device~~it~~. ~~It furthermore allows swiveling A~~a patient lying on the device may be swiveled~~it~~ either toward the gantry or toward some other kind of medical equipment, such as a C-arch X-ray machine. By moving the patient to the other device using the device for supporting a patient, another medical examination is made possible without first shifting the patient to another stretcher. This reduces the burden both on the medical staff and on the patient ~~himself~~.

[0015] ~~In a further advantageous embodiment~~In yet another aspect, the device for supporting a patient has a rotary bearing which is mounted on the load-bearing arm and ~~is embodied so as for~~ support~~sting~~ the stretcher rotatably about a vertical axis. The rotary bearing represents a second axis of rotation, which expands the motion capabilities of the device for supporting a patient. ~~It makes it possible not only to pivot~~ In addition to permitting motion of the stretcher toward the gantry or away from the gantry, the stretcher may be rotated in any ~~it but also to execute an additional rotation in any~~ pivoted position. ~~This not expands the positioning possibilities with respect to other medical devices, but~~ The additional rotatability can also be used to reduce the space required for pivoting motions, ~~for instance because~~and the pivoting radius of the device for supporting a patient together ~~with the patient~~ is reduced.

[0016] In ~~a further advantageous embodiment of the invention,~~still another aspect, the device for supporting a patient has a stretcher guide, which is mounted

on ~~the~~ a rotary bearing ~~rotatably~~ rotatable about a vertical axis and ~~is embodied~~is configured ~~for~~ to support~~ing~~ a stretcher longitudinally displaceably. The ~~displaceability can serve to slide the~~ stretcher, with the patient lying on it, may be slind into the gantry or back out again~~. It~~ representsing a further possibility for flexible positioning of the patient or the stretcher.

[0017] In a further ~~advantageous embodiment of the invention~~aspect, the device for supporting a patient has a second height adjuster~~, which is embodied~~ for supporting a stretcher adjustably in height~~,~~ and which can be mounted on the computer tomography device in such a way that ~~it~~ the second height adjuster is located laterally with respect the examination opening. ~~As a result, first, the possibilities for positioning the stretcher are expanded still further because t~~The patient may be~~is~~ supported by either one or the other of the height adjusters. ~~Second, it enhances the flexibility in the sense that one stretcher per height adjuster is used, and T~~the ~~T~~two stretchers can, for instance, be slid into or out of the gantry in alternation. The alternating use makes more efficient use of a computer tomography device possible, ~~because for~~ as ~~instance~~ one patient may be ~~is~~ prepared using the one height adjuster, while another patient may be~~is being~~ examined in the computer tomography device, using the other height adjuster.

[0018] In a still further ~~advantageous embodiment of the invention~~aspect, the second height adjuster ~~is embodied for~~ support~~sing~~ a stretcher on ~~the other~~ a side of the examination opening, diametrically opposite the first height adjuster ~~in the passage direction~~with respect to an aperture in the gantry. ~~This has the advantage that~~ A ~~a~~ patient on one height adjuster ~~can~~ may be moved into the gantry while being additionally supported on the opposite side of the gantry on the opposite height adjuster.

[0019] ~~Further advantages of the invention will become apparent from the description of the drawings.~~

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Exemplary embodiments of the invention are described in further detail below in conjunction with the drawings. Shown are:

[0021] Fig. 1, a device for supporting a patient at a gantry;

[0022] Fig. 2, the device for supporting a patient in a pivoted position;

[0023] Fig. 3, the device for supporting a patient pivoted toward a C-arch X-ray machine; and

[0024] Fig. 4, a device for supporting a patient with a second height adjuster.

DETAILED DESCRIPTION

[0025] Exemplary embodiments may be better understood with reference to the drawings, but these examples are not intended to be of a limiting nature. Like numbered elements in the same or different drawings perform equivalent functions.

[0026] ~~In~~ Fig. 1shows~~,~~ a device for supporting a patient ~~is shown~~ at a computer tomography device (CT) 1. The CT 1 has a gantry 3, inside of which an X-ray beam source, ~~not shown,~~ and a diametrically opposed~~ite it an~~ X-ray image detector rotate (the X-ray beam source and detector are not shown). The center of ~~the~~ rotary motion is located in the examination opening 4 of the gantry 3. A patient to be examined is slid into the examination opening 4, and both the X-ray beam source and the X-ray image detector rotate around ~~him~~the patient and ~~in the process pick up~~acquire the raw image data.

A device 5 for supporting a patient is mounted on the gantry 3 and is adapted to~~4. It carries~~ support a stretcher 7, on which a patient can be laid. The stretcher 7 is held by a stretcher guide 11 such that ~~it~~ the stretcher 7 is longitudinally displaceable ~~inside~~ with respect to the stretcher guide 7. The ~~capability~~ range of longitudinal displacement ~~can be utilized~~may be such that the stretcher 7 is thrust out of the examination opening 4 so a patient can be placed on the stretcher 7~~it~~. In that position, the stretcher 7 is readily accessible. ~~For picking up the raw CT image data, t~~The stretcher 7 is slid, with the patient, into the introduction opening 4 for the purpose of ~~picking~~ acquiring~~up~~ the raw CT image data.

[0027] The stretcher guide 11 is supported by a load-bearing arm 9, with which it is solidly connected. The load-bearing arm 9 ~~in turn~~ is supported ~~in~~ by a load-bearing arm bearing 13. The load--bearing arm bearing 13 is connected to a height adjuster 15, by which the height of the load-bearing arm 9 can be adjusted. In Fig. 1, ~~In the drawing,~~ the load-bearing arm 9 is not shown at ~~its~~ a maximum height but instead has been slightly lowered ~~compared to it. The amount of this lowering is represented in the drawing by the letter h~~by a distance h.

[0028] The amount of the lowering of the load-bearing arm 9 is limited only by the ~~mode of operation~~capability of the height adjuster 15. ~~The~~ As such, load-bearing arm 9, and thus the stretcher 7, can be lowered as far as the height adjuster 15 ~~allows~~permits, with a ~~at~~ maximum lowering placing the stretcher ~~as far as~~ onto or near the floor of the examination room where the CT 1 is located. Because of the lateral location of the height adjuster 15 with respect to the CT 1, the height adjuster 15 does not~~, with its own dimensions,~~ limit the maximum possible lowering, since it is not located between the stretcher 7 and the floor of the examination room. As a result, the stretcher 7 can be lowered optimally ~~in~~ for each specific medical situation ~~each case in adaptation to given conditions~~so that, for instance, ~~so that~~ a patient can be laid on the stretcher 7~~it~~ with ~~the least possible amount~~reduced ~~of~~ effort. If needed, ~~for instance,~~ a patient can be placed on the stretcher 7 that has been lowered to near the floor, and the stretcher ~~is~~ then raised to the level of the examination opening 4 so that the stretcher 7 can be introduced into the -examination opening 4~~it~~.

[0029] ~~In Fig. 2, a CT 1 as in the preceding drawing is shown, and to that extent the same reference numerals are used.~~ In an aspect shown in Fig. 2, ~~the embodiment shown~~, the load-bearing arm 9 that carries the stretcher 7 is supported in the device 5 for supporting a patient rotatably about a vertical axis. ~~It~~ The load-bearing arm 9 is shown pivoted about ~~this~~ the vertical axis of rotation such that the stretcher guide 11 and the stretcher 7 are rotated away from the gantry 3~~. In the embodiment shown,~~ Tthe load-bearing arm 9 is pivoted together with the load-bearing arm bearing 13 and the height adjuster 15. Alternatively~~In a different~~

~~embodiment~~, the load-bearing arm 9 may be supported rotatably in the load-bearing arm bearing 13, so that only the load-bearing arm 9 is pivoted~~,~~ independently of the load-bearing arm bearing 13 and the height adjuster 15.

[0030] In another aspect, Fig. 3 shows~~ns~~ a C-arch X-ray machine 2 ~~is shown~~and a CT 1. The load-bearing arm 9, together with the stretcher 7, is shown pivoted away from the gantry 3 and into the vicinity of the C-arch X-ray machine 2. ~~As a result, a~~A patient lying on the stretcher 7 can be moved back and forth between the CT 1 and the C-arch X-ray machine 2 without having to be shifted from one stretcher to another. Instead, ~~he~~ the patient can stay on the stretcher 7 and ~~is~~ be moved back and forth by means of the pivoting motion of the device for supporting a patient.

[0031] ~~In the embodiment shown, A~~a rotary bearing 17 ~~that~~ supports the stretcher 7 rotatably about a vertical axis, and the rotary bearing 17 is mounted on the load-bearing arm 9. ~~Because of~~With the additional rotary motion, the ~~possibilities for~~ exact positioning of the patient, either in the CT 1 or in the C-arch X-ray machine 2~~,~~is facilitated ~~can be expanded~~. The clear space required for the pivoting motion ~~in~~ when pivoting the load-bearing arm 9 can also be ~~modified~~optimized. In the rotary position shown for the stretcher 7, this radius is ~~minimal~~ small, ~~while~~ whereas ~~it~~ the required clear space would ~~conversely~~ be maximal with the stretcher 7 rotated by 90° with respect to the load-bearing arm 9. Varying the radius of the pivoting motion also expands the range for moving the patient from one device to another using the device ~~5~~ for supporting a patient. As a result, the patient can be moved to other devices, not shown, without having to be shifted from one stretcher to another.

[0032] ~~In Fig. 4, a~~In yet another aspect shown in Fig. 4, CT 1 ~~as in the preceding drawings is shown,. As described above,~~ has a device 5 for supporting a patient with a load--bearing arm 9 and a stretcher guide 11 ~~is shown~~as previously described. A stretcher 7 rests on the stretcher guide 11. Laterally with respect to

the gantry, there is a height adjuster 15, which supports the load-bearing arm 9 adjustably in height in the load-bearing arm bearing 13.

[0033] ~~In the embodiment shown, A~~a further load-bearing arm 9' is provided, ~~which~~ having ~~has~~ a further stretcher guide 11'. The ~~further~~ load-bearing arm 9' is supported in a ~~further~~ load-bearing arm bearing 13' and is supported adjustably in height by a ~~further~~ height adjuster 15'. The height adjuster 15', together with the load-bearing arm bearing 13' and the load-bearing arm 9', is located on the ~~other~~ opposite side of the examination opening 4 with respect to the passage direction.

[0034] As a result of the lateral location of the height adjuster 15' next to the gantry 3 and thus next to the examination opening 4, the maximum lowerability of the stretcher guide 11' on the load-bearing arm 9' is ~~assured~~possible. A patient lying on the stretcher 7 can be slide~~,~~ from the stretcher guide 11~~,~~ into the examination opening 4 and advanced as far as ~~the other~~ stretcher guide 11'. Because of the support of the patient on the further stretcher guide 11', sagging of the stretcher 7 because of the patient's weight can be reduced. ~~Furthermore,~~ Oonce the raw CT image data has been acquired with the patient lying on the first stretcher guide 11, the patient on the stretcher 7 can be slid all the way through to the other side of the examination opening 4 ~~while lying on~~with the stretcher 7 being supported by stretcher guides 11 and 11' as appropriate. ~~the further stretcher guide 11'.~~ When the stretcher is supported on ~~On the further~~ stretcher guide 11', the patient~~the~~ can be moved for instance to a different medical device or taken to a place where another medical action is taken. For that purpose, the movement capabilities described in conjunction with the preceding ~~drawings~~ examples can be ~~provided~~ performed by ~~for~~ the load-bearing arm 9' and the stretcher guide 11' ~~as well~~.

[0035] Although only a few exemplary embodiments of this invention have been described in detail above, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of the invention. Accordingly,

all such modifications are intended to be included within the scope of this invention as defined in the following claims.

Attorney Docket No. 11371-113
Siemens AG Ref. No.
Substitute Specification With Markings

ABSTRACT OF THE DISCLOSURE

~~The invention relates to~~ A~~a~~ device for supporting a patient ~~which~~ is used ~~for examining~~with a computer-tomography (CT) device. The patient to be examined is to be introduced into an opening in a gantry of the CT device. ~~which comprises a gantry provided with an opening and which is inserted into the patient who is to be examined. Said~~ The patient supporting device ~~for supporting a patient comprises~~ has a height-adjustable device disposed laterally with respect to the gantry opening ~~which is~~and permits ~~embodied in such a manner that~~ the height of a support for a patient ~~of the patients couch can~~to be adjusted. A support arm extends from the height-adjustable device to a fixture for supporting a stretcher and is rotatable with respect to the height adjustable device. ~~According to the invention the height adjustable device can be brought towards the computer tomographs in such a manner that it is arranged on the side of the examination opening.~~